We Claim:

1. A method for separating a population of particles according to size comprising the steps of:

subjecting the particles to an optical gradient pattern having a defined spatial periodicity,

moving the gradient relative to the particles,

wherein the improvement comprises selecting the spatial periodicity of the gradient to have a differential effect on differently sized particles.

2. The method of claim 1 wherein certain of the particles are smaller than the spatial periodicity of the gradient and certain of the particles are larger than the period.

3. The method of claim 2 wherein the larger particles are larger than the spatial periodicity of the gradient.

4. The method of claim 1 further including the step of varying the osmotic properties of the medium to change the size of the particles.

5. The method of claim 1 wherein the particles are biological particles.

6. The method of claim 5 wherein the biological particles are cells.

7. The method of claim 6 wherein the cells are red blood cells.

8. The method of claim 5 wherein the biological particles are liposomes.

9. A method for separating particles based upon flexibility, comprising the steps of:

subjecting the particles to an optical gradient pattern having a defined spatial periodicity, the periodicity being less than the size of the particle in an uncompressed state,

moving the fringes relative to the medium containing the particles, and

whereby particles having relatively higher flexibility are separated from those with relatively lower flexibility.

10. The method of claim 9 wherein the particles in their uncompressed state are larger than the spatial periodicity of the gradient.

11. The method of claim 9 wherein the particles are biological particles.

12. The method of claim 11 wherein the biological particles are cells.

13. The method of claim 12 wherein the cells are red blood cells.

14. The method of claim 11 wherein the biological particles are liposomes.